

REQUEST FOR RECONSIDERATION

Claims 11-21 remain active in this application.

The claimed invention is directed to an offshore pipe comprising a layer of a syntactic polyurethane comprising a polyol component which comprises a polyetherpolyol and 10 to 90 wt. % of an oil based on C₆₋₂₅ fatty acids and comprising hollow microspheres.

Applicants wish to thank examiner Kashnikow and supervisory examiner Dye for the helpful and courteous discussion held with their U.S. representative on November 22, 2010. At that time, applicants' U.S. representative provided an English language translation of Sano et al. and discussed the lack of motivation to merely substitute one polyurethane for another in an insulated offshore pipe in view of the specialized demands in terms of long term heat resistance and compressive strength, as well as the demonstrated enhancement in hydrolytic stability when using a fatty acid oil, as claimed. The following is intended to expand upon the discussion with the examiners.

Offshore pipes, used to transport oil through the ocean depths, are benefited by thermal insulation properties which have heretofore been achieved by inclusion of a hollow microfillers. However, such microfillers can lead to a reduction in hydrolytic stability as well as unsatisfactory low-temperature flexibility. Accordingly, offshore pipes having good thermal insulation properties, hydrolytic stability and low temperature flexibility are sought.

The claimed invention addresses his problem by providing an offshore pipe comprising a layer of a syntactic polyurethane comprising a polyisocyanate component, a polyol component which comprises a polyetherpolyol having a hydroxyl number of from 10 to 280 and 10 to 90 wt. % of an oil based on C₆₋₂₅ fatty acids and hollow microspheres. Applicants have discovered that the presence of 10 to 90 wt. % of an oil based on C₆₋₂₅ fatty acids in the polyol component can improve stability to hydrolysis. Such an offshore pipe is nowhere disclose or suggested in the cited references.

The rejection of claims 11-21 under 35 U.S. C. 103(a) over Grimm et al. U.S. 6,387,447 in view of Sano JP 59-197466 is respectfully traversed.

None of the cited references, alone or in combination suggest that the claimed polyol component containing a polyetherpolyol and 10 to 90 wt. % of an oil based on C₆₋₂₅ fatty acids would provide improved hydrolytic stability in an artificial seawater test.

Grimm et al. has been cited for a disclosure of a pipe comprising a syntactic polyurethane layer comprising a polyol having an OH number of 36 as well as castor oil, citing example 1. Castor oil is present as a result of its use as a carrier for a zeolite component. There is no specific reason to incorporate castor oil into the polyurethane. The reference establishes property requirements for the polyurethane in terms of heat distortion point and compressive strength in view of the operating temperatures of flowing oil and the use at sea depths of up to 2,500 m.

Sano et al. merely describes a metal coating composition having corrosion resistance, insulating properties, water resistance and impact resistance (see abstract). There is no disclosure of hollow microspheres. There is no disclosure of heat distortion or compression strength suitable for offshore oil pipe use. The coating composition is comprised of (a) a polyol having a main chain of only C and H atoms, (b) castor oil, (c) a polyol having hydroxyl groups and/or amino groups and (d) an organic isocyanate. (page 3 of English translation). Page 4 of the English translation describes examples of component (c) as “methylene bis which 2 or more possesses these alkylene oxide-adding copolymerization adding thing or other hydroxyl group.” There is no disclosure of a polyether polyol component having a hydroxyl number of from 10 to 280.

Applicants respectfully submit that due to the self-imposed performance requirements of Grimm of long term heat resistance and compressive strength, one of ordinary skill into the art would not have been motivated to simply substitute the polyurethane of Sano et al. in the

microsphere containing offshore oil pipe of Grimm et al. Specifically, there is no suggestion that the polyurethane of Sano et al. would be possessed of such specific heat distortion properties and compression strength such that one of ordinary skill in the art would not be motivated to simply make the polyurethane replacement as suggested.

Furthermore, the combined disclosures of Grimm et al. and Sano et al. fail to suggest an enhancement in hydrolytic stability.

Grimm et al. merely includes castor oil as a vehicle for introduction of a moisture scavenging zeolite, a content of castor oil which has no effect on the water uptake of the polyurethane and therefore the hydrolytic behavior. Sano et al. simply discloses a coating composition for metal.

Applicants have previously submitted testing of the hydrolytic stability in an artificial seawater test of a syntactic polyurethane containing a polyol component containing 10 wt. % of an oil based on C₆₋₂₅ fatty acids as compared with a composition containing less than 10 wt. % (e.g. only 2.5 wt. %) of a C₆₋₂₅ fatty acid. The evidence was submitted on December 3, 2009 in the form of the declaration of Dr. Jeffrey Dodge, a researcher with BASF Co., a party which may have an interest in the issuance of the above-identified application, as a patent.

Dr. Dodge prepared two samples in order to demonstrate an enhanced hydrolytic stability for a composition containing at least 10 wt. % of fatty acid oil.

A masterbatch comprising 41.1 wt.% of a poly(propyleneoxide) OH # 56 (polyol 1), 40.98 wt. % of a poly(propyleneoxide) OH #58 (polyol 2), 15.75 wt. % of dipropylene glycol, and 2.17 wt. % of an additive package comprising catalyst, amino-silane, moisture scavenger and defoamer was prepared. To 76.25 g of this masterbatch, 1.96 g of castor oil and 23 g of S35 glass microspheres were added to form comparative example 1 having only 2.5 wt. % of castor oil¹. To 76.25 g of this masterbatch, 8.48 g of castor oil and 24.9 g of S35

¹ Wt. % is based on the total weight of polyol components.

glass microspheres were added to form example 1 having 10 wt. % of castor oil². Each sample contained 22.7 wt. % of glass microspheres³.

Polyurethane samples were formed by reaction with diisocyanate and formed into 1/8" thick samples. The samples were immersed in ASTM-grade artificial sea water at 80°C, and weighed at specified time intervals to determine the water content. The data is reported as below:

Water content after weeks (wt.%)	example	Comp example 1
0	0	0
1	4.15	4.43
2	4.44	4.79
3	4.54	4.96
4	4.75	4.89
6	4.71	5.1

The data demonstrates an increased uptake in water, indicative of hydrolysis of the syntactic polyurethane for Comparative Example 1 containing only 2.5 wt.% of castor oil as compared with the example containing 10 wt. % of castor oil. Such an improvement in hydrolytic stability from the addition of a fatty acid oil to the polyol component is not suggested by the cited references. Such tests were performed on identical amounts of masterbatch, the content of glass microspheres being adjusted to provide the same wt. % and the content of castor oil being adjusted to provide contents of 2.5 wt. % and 10 wt.% respectively.

Thus, the data demonstrates an enhanced hydrolytic stability through the incorporation of at least 10 wt. % of a fatty acid oil. The examiner is again reminded of the example from the Huntemann declaration submitted on November 6, 2009 in which the fatty

² Wt. % is based on the total weight of polyol components.

³ Due to the use of a masterbatch mixture in the preparation of compositions containing 2.5 and 10 wt. % castor oil, the relative contents of masterbatch components in the final compositions will vary slightly between the two compositions.


acid oil content was 61.16 wt. %. Thus, applicants have demonstrated an enhanced hydrolytic stability when the content of fatty acid oil ranges from 10 to 61.16 wt. %.

As the cited references fail to suggest an improvement in hydrolytic stability by the addition of a fatty acid oil to the polyol component, the claimed invention is not rendered obvious by the cited references and withdrawal of the rejection under 35 U.S.C. §103(a) is respectfully requested.

Applicants submit that this application is now in condition for allowance and early notification of such action is earnestly solicited.

Respectfully submitted,

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